

*Ollscoil na hÉireann, Gaillimh*  
*National University of Ireland, Galway*

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**Winter Examinations, 2007/2008**

Exam Code(s)	4IF1
Exam(s)	Bachelor of Science in Information Technology
Module Code(s)	CT417
Module(s)	Software Engineering III
Paper No.	1
Repeat Paper	N Special Paper N
External Examiner(s)	Prof. J. Keane
Internal Examiner(s)	Prof. G. Lyons
	Dr M. Madden
	Dr S. Flynn

**Instructions:**

Answer 4 questions, 2 from Section A and 2 from Section B.  
Use separate answer books for Section A and Section B.  
All questions carry equal marks.

Duration	3 hrs
No. of Answer books	2

**Requirements:**

Handout	
MCQ	
Statistical Tables	
Graph Paper	
Log Graph Paper	
Other Material	

No. of Pages	5
Department(s)	Information Technology

## **SECTION A**

1. (a) Discuss the relationship between PRINCE2 and PMBOK, in terms of their similarities and differences. **(6)**  
  
(b) You are a newly-appointed manager of a software development project in a small company. Explain how you could begin implementation of PRINCE2 and also how you could integrate PRINCE2 and PMBOK in your work. **(8)**  
  
(c) Discuss the importance of having a cohesive project team, and the problems that may accrue when the team lacks cohesion. Outline some remedies for problems with teams. **(6)**
  
2. (a) You are the project manager for a new anti-virus software product. You need to decide whether or not to outsource a database component that will be part of the product. Describe the decision-making process you will follow, which will include an assessment of the merits and demerits of outsourcing. **(10)**  
  
(b) Procurement contracts may be categorised according to the payment terms. Describe the range of contracts, and explain how they vary according to buyer and seller risk. **(5)**  
  
(c) Software procurement may involve bespoke, OTS or COTS software products. Explain these terms and give an example of where each might be relevant. **(5)**
  
3. (a) Performance reporting is a typical part of project communications. Explain its purpose. Within this context, describe how an earned value analysis is performed. **(4)**  
  
(b) You are managing a project that will involve research and development to produce a medical diagnosis software product, over an 18-month period. First, distinguish between risk identification and risk quantification, explaining the purpose of each. Then describe how you would go about identifying and quantifying the risks associated with this project. **(8)**  
  
(c) Compare and contrast the Unified Process with Agile Methods. As part of your discussion, describe their key characteristics, techniques used, and the types of project to which they are best suited. **(8)**

4. (a) The purpose of project estimation is to produce estimates of the *size* and *effort* for a planned project. Describe how you would do this for Version 2 of a software product, in which the product is being re-implemented in a new language and development framework, and with significant new functionality. **(8)**
- (b) Identify three issues that contribute to the difficulty in preparing accurate project schedules. With reference to the scenario of Part (a) above, consider how these issues might arise and explain what steps you would take to reduce problems associated with them. **(6)**
- (c) Project-oriented organisations may use a matrix structure. Explain what this is and outline its key characteristics, including advantages and disadvantages relative to other organisational structures. **(6)**

## SECTION B

5. (a) *The quality of a software product is completely independent of the quality of the process used to create it. Argue for or against this statement.* (6)
- (b) According to Crosby, *Quality is free*. Write a note on your understanding of the economics of quality. How would you use this to persuade the CEO of a small software organisation that investment in quality improvement is worthwhile? (8)
- (c) Forces for change in a Quality Management System (QMS) can come from the top-down and from the bottom-up. Explain the commitments required from all staff in a Total Quality Culture. (6)
6. (a) Many aspects of software products, projects and processes can be measured. Describe how the GQM approach can be used to identify appropriate metrics. (6)
- (b) Suppose you have overall responsibility for a number of ongoing software projects. There are wide quality variations among the projects, and you have the following measures for each project:
- Mean time to failure
  - Mean time to repair reported defects
  - Total number of user-reported failures
  - Total number of defects found during system testing
  - Total project overspend/underspend
- Discuss the relative merits of these measures for purposes of comparison across projects. (8)
- (c) Explain the importance of a metrics programme, aligned to organisational goals, in the Software Process Improvement (SPI) cycle. (6)
7. (a) Three of the process areas identified in ISO9001:2000 are:
- control of non-conforming product;
  - purchasing;
  - monitoring and measurement.
- Choosing any two of these, describe how they could be applied to the software industry. (6)
- (b) Customer Focus is the first of the Quality Management Principles identified in the ISO9000:2000. Explain the role of the customer in a Quality Management System and Continuous Process Improvement. (8)
- (c) The ISO15504 (SPICE) model has influenced the development of both the ISO9000:2000 and the CMMI. In what way? (6)

8. Read the following case study and address the question below.

**Quality Software Solutions – 2 years on:** since your appointment as Quality Manager, QSS has recently been assessed at level 2 of the CMMI staged model. Over the last 2 years the company has grown from 20 to 45 people, and have managed to maintain their market position in the development of library information systems. As a result of a successful SPI initiative, a set of processes are now in place to address the key project management issues, and useful metrics have been collected on a project basis of size and cost estimates, actuals versus estimates rate of changes to requirements, etc.

However, in a recent project to implement a new Intelligent Search subsystem, a number of problems were identified while carrying out some software engineering activities:

- A number of significant errors were introduced into the software design, which were not noticed until the system testing stage. The project incurred significant costs in fixing these.
- A number of bugs that were identified at system test were never fixed.
- A small change was made to one of the modules, but this introduced a new, more significant error.
- The software documentation produced did not reflect the original requirements.

Up to now, the project team had used Visual Basic for each project, so it was possible to base size and cost estimates on previous similar work. However, for this project new technologies were introduced and so the project manager had no historical data. A small amount of information was available from another project team, but no formal mechanism was in place to share this information. Some coding standards were in use by the other team, but the project manager was unaware that these standards were available.

- (a) Identify some suitable CMMI maturity level 3 practices that you feel would be suitable for QSS to address in the short term, and show how these address the problems identified in the case study. (8)
- (b) The four categories of CMMI process areas are: process management, project management, engineering and support. Discuss how project management is addressed at level 2 of the staged representation of the CMMI. (6)
- (c) How would you advise the director, Brian O'Neill, who states that he wants to achieve CMMI level 3 by June 2008? (6)